Notice No.2

Rules and Regulations for the Classification of Ships, July 2020

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: December 2020

Amendments to	Effective date	IACS/IMO implementation (if applicable)
Part 5, Chapter 24, Section 10	1 January 2021	1 January 2021
Part 5, Chapter 25, Sections 8, 9 & 11	1 January 2021	NA
Part 8, Chapter 2, Section 10	1 January 2021	1 January 2021

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Part 5, Chapter 24
Emissions Abatement Plant for Combustion Machinery

■ *Section 10*
Storage and use of chemicals

10.1 Sodium hydroxide solution

10.1.1 Chemical storage tanks that contain sodium hydroxide (NaOH) solution (e.g. 50 per cent aqueous solution) are to comply with the requirements given in *Pt 5, Ch 24, 10.1 Sodium hydroxide solution 10.1.2* to *Pt 5, Ch 24, 10.1 Sodium hydroxide solution 10.1.~~18~~ 19*.

10.1.11 Where chemical storage tanks are installed in closed compartments, the compartments are to be served by an effective extraction type mechanical ventilation system capable of providing not less than six air changes per hour, which is independent from the ventilation system of accommodation, service spaces or control stations.

10.1.12 The ventilation system is to be capable of being controlled from outside the compartment and is to be in continuous operation except when the chemical storage tank is empty and has been thoroughly ~~air purged~~ ventilated. A warning notice requiring the use of such ventilation before entering the compartment shall be provided outside the compartment adjacent to each point of entry.

10.1.14 The chemical storage tanks are to rearranged so that they can be emptied~~, purged~~ and ~~vented~~ ventilated by means of portable or permanent systems.

10.1.15 Where a chemical storage tank is located within an engine room, a separate ventilation system defined in *Pt 5, Ch 24, 10.1 Sodium hydroxide solution 10.1* is not required when the general ventilation system for the space is arranged so as to provide an effective movement of air in the vicinity of the storage tank, and is to be maintained in operation continuously except when the storage tank is empty and has been thoroughly ~~air purged~~ ventilated.

10.1.18 For the protection of personnel, the ship is to have suitable personnel protective equipment on board such as, but not limited to, aprons, gloves, boots and safety goggles. Eyewash stations ~~and safety showers~~ are to be provided in locations where chemical contact is most likely to occur. The location (e.g. near chemical storage tank, loading area, etc.) and number of these eyewash stations ~~and safety showers are~~ is to be derived from the detailed installation arrangements.

10.1.19 The requirements for the ventilation system specified in the paragraphs *Pt 5, Ch 24, 10.1 Sodium hydroxide solution 10.1.11* and *10.1.12* also apply to the following closed compartments normally entered by persons:

- When such closed compartments are adjacent to the integral urea tanks and there are possible leakage points (e.g. manholes, fittings) from these tanks;
- When the chemical piping systems pass through such compartments, unless the piping system is made of steel or other equivalent material with a melting point above 925°C .

10.2 Sodium bicarbonate

10.2.2 Suitable personnel protection shall be provided in accordance with *Pt 5, Ch 24, 10.1 Sodium hydroxide solution 10.1. ~~18~~ 19*.

10.3 Ammonia solution

10.3.1 Chemical storage tanks that contain urea-based ammonia (e.g. 40 per cent urea with 60 per cent water solution), hereinafter referred to as urea solution, as a reductant, are to comply with the requirements given in *Pt 5, Ch 24, 10.1 Sodium hydroxide solution 10.1.2* to *Pt 5, Ch 24, 10.1 Sodium hydroxide solution 10.1.~~18~~* 19, and

- Tanks are to be of steel or other equivalent material with a melting point above 925°C.
- Pipes/piping systems are to be of steel or other equivalent material with melting point above 925°C, except downstream of the tank valve, provided this valve is metal seated and, in the event of fire, is arranged as fail-to-closed or equipped with quick closing facilities operable from a safe position outside the space. In such cases, Type Approved plastic piping is acceptable without the need for fire endurance testing.
- Tanks and pipes/piping systems are to be made with materials compatible with reductant or coated with appropriate anti-corrosion coating.

Part 5, Chapter 25
Ballast Water Treatment System and Installation

■ *Section 8*
Mechanical equipment and components

8.3 Other Components

8.3.2 Ozone generators, electro chlorination units, electrolysis units, air compressors, oxygen generators, electrodialytic units, ultraviolet units, ultrasonic units, coagulation units, other treatment units and ancillaries are to be constructed to recognised industrial, National or International Standards acceptable to LR. These components are to be tested to 1.5x their working pressure during manufacture of the BWMS.

8.3.3 Pressurised components such as heat exchangers, air and fluid storage bottles are to satisfy the requirements of *Pt 5, Ch 11 Other Pressure Vessels* as appropriate.

■ *Section 9*
Electrotechnical Systems

9.1 General

9.1.3 A gas detection system with audible and visual alarm is to be provided for spaces, where dangerous gas could be present. For flammable atmospheres, the BWTS shutdown is to be activated at a flammable concentration of not more than 60 per cent of ~~LEL~~ LFL. The alarm is also to be provided ~~on the bridge,~~ at manned ballast water control station(s) and in the engine control room, as applicable. Audible and visual alarm signals are to be activated both locally and at the control station(s) when the flammable concentration reaches a pre-set value, which should not be higher than 30 per cent of the ~~LEL~~ LFL of the product concerned.

9.1.9 Activation of by-pass or isolation arrangements is to activate an alarm in all stations from which the ballast water operations are controlled ~~and on the navigating bridge,~~ and be automatically recorded in control equipment.

9.1.9 Activation of by-pass or isolation arrangements is to activate an alarm in all stations from which the ballast water operations are controlled ~~and on the navigating bridge,~~ and be automatically recorded in control equipment.

■ *Section 11*
System Arrangement Requirements

11.2 By-pass and isolation

~~11.2.2 By-pass and isolation valves are to be provided with remote means of operation and are also to comply with the requirements of *Pt 5, Ch 12, 6.1 Design requirements 6.1.3* and *Pt 5, Ch 12, 6.1 Design requirements 6.1.4* and *Pt 5, Ch 13, 2.3 Valves – Installation and control.*~~

Existing paragraphs 11.2.3 to 11.2.5 have been renumbered 11.2.2 to 11.2.4.

Part 8, Chapter 2
Ice Operations – Ice Class

■ *Section 10*

Hull strengthening requirements for navigation in multi-year ice conditions – Ice Classes PC1, PC2, PC3, PC4, PC5, PC6, PC7 and Icebreaker

10.1 Definitions

10.1.1 The length L_{UI} is the distance, in m, measured horizontally from the fore side of the stem at the intersection with the upper ice waterline (UIWL) to the after side of the rudder post, or the centre of the rudder stock if there is no rudder post. L_{UI} is not to be less than 96 per cent, and need not be greater than 97 per cent, of the extreme length of the upper ice waterline (UIWL) measured horizontally from the fore side of the stem. In ships with unusual stern and bow arrangement the length L_{UI} will be specially considered.

10.1.2 The ship displacement Δ_{UI} is the displacement, in kilo tonnes, of the ship corresponding to the upper ice waterline (UIWL). Where multiple waterlines are used for determining the UIWL, the displacement is to be determined from the waterline corresponding to the greatest displacement.

~~10.1~~ 10.2 Hull areas

Existing paragraphs 10.1.1 to 10.1.3 have been renumbered 10.2.1 to 10.2.3.

~~10.1.4~~ 10.2.4 In addition to *Figure 2.10.1 Extent of hull areas*, the aft boundary of the bow region need not be more than $0{,}45L_{UI}$ aft of the fore side of the stem at the intersection with the upper ice waterline (UIWL) ~~forward perpendicular, *FP*~~.

~~10.1.5~~ 10.2.5 The forward boundary of the stern region is to be at least a distance *Z* from the aft ~~perpendicular~~ end of L_{UI}, where *Z* is $0{,}7b$ or $0{,}15L_{UI}$ whichever is greater. *b* is the distance from the aft ~~perpendicular~~ end of L_{UI} to the maximum half breadth at the UIWL and L_{UI} is defined in ~~*Pt 8, Ch 2, 10.4 Bow area 10.4.3*~~ *Pt 8, Ch 2,10.1 Definitions 10.1.1*.

Existing paragraphs 10.1.6 and 10.1.7 have been renumbered 10.2.6 and 10.2.7.

~~10.1.8~~ 10.2.8 In addition to *Figure 2.10.1 Extent of hull areas* if the ship is assigned the additional notation **Icebreaker** the forward boundary of the stern region is to be at least $0{,}04L_{UI}$ forward of the section where the parallel ship side at the upper ice waterline (UIWL) ends.

Existing Figure 2.10.1 has been deleted and replaced with the below.

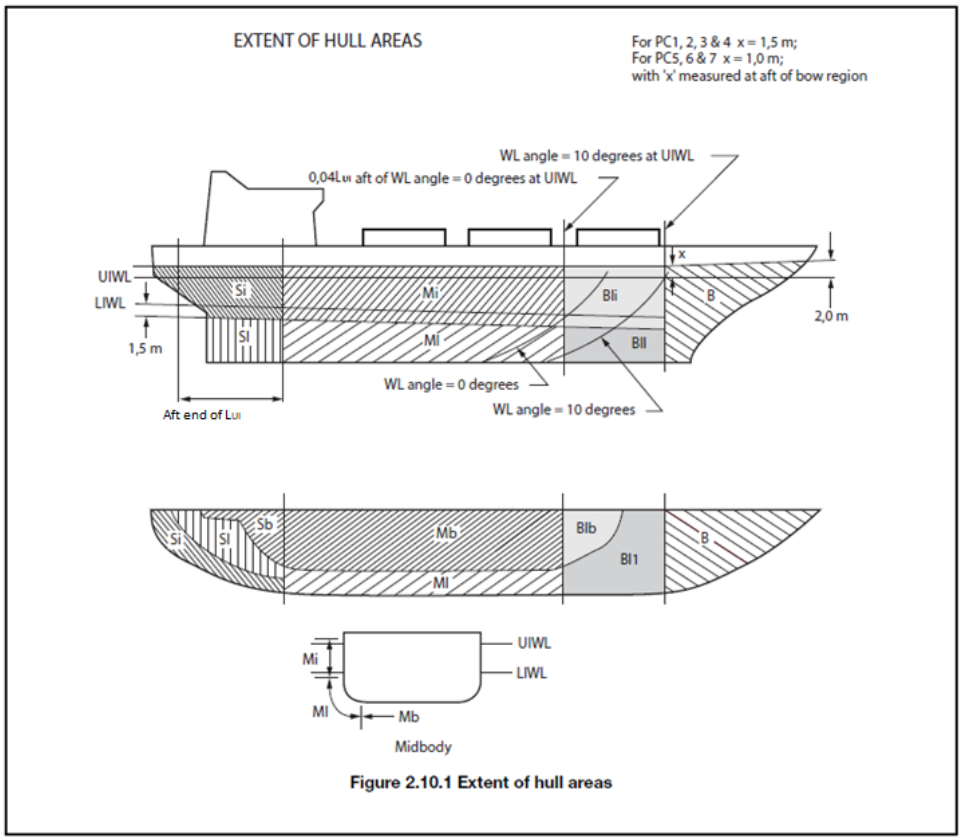

Figure 2.10.1 Extent of hull areas

Existing sub-Sections 10.2 and 10.4 have been renumbered 10.3 and 10.4.

~~10.4~~ 10.5 Bow area

Existing paragraphs 10.4.1 and 10.4.2 have been renumbered 10.5.1 and 10.5.2.

(Part only shown)
~~10.4.3~~ 10.5.3 The bow area load characteristics for icebreaking bow forms, as defined in *Pt 8, Ch 2, 10.3 Design ice loads – General 10.3.6*, are determined as follows:

(a) The shape coefficient, fa_i , is to be taken as:

$$fa_{i,1} = \frac{\alpha_i}{\left(0,097 - 0,68\left(\frac{x}{L} - 0,15\right)^2\right)\sqrt{\beta'_i}}$$

$$fa_{i,2} = \frac{1,2C_F}{\sin(\beta'_i)C_c\Delta^{0,64}}$$

$$fa_{i,1} = \left(0,097 - 0,68\left(\frac{x}{L_{UI}} - 0,15\right)^2\right)\frac{\alpha_i}{\sqrt{\beta'_i}}$$

$$fa_{i,2} = \frac{1,2C_F}{\sin(\beta'_i)C_C\Delta_{UI}^{0,64}}$$

L_{UI} = ~~ship~~ length, as defined in ~~*Pt 3, Ch 1, 6.1 Principal particulars 6.1.1*, but measured on the upper ice waterline (UIWL),~~ *Pt 8, Ch 2, 10.1 Definitions 10.1.1* in metres
x = distance from the fore side of the stem at the intersection with the upper ice waterline (UIWL) ~~forward perpendicular (FP)~~ to station under consideration, in metres
Δ_{UI} = ~~ship~~ displacement as defined in *Pt 8, Ch 2, 10.1 Definitions 10.1.2*, in kilo tonnes, not to be taken less than 5

(b) Force, F_i :

~~$F_i = fa_i\ C_c\ \Delta^{0,64}$ MN~~

$$F_i = fa_i C_C \Delta_{UI}^{0,64} \text{ MN}$$

where
Δ_{UI} = ~~ship~~ displacement as defined in *Pt 8, Ch 2, 10.1 Definitions 10.1.2*, in kilo tonnes, not to be taken less than 5

(Part only shown)
~~10.4.3~~ 10.5.4 The bow area load characteristics for bow forms with vertical sides, as defined in *Pt 8, Ch 2, 10.3 Design ice loads – General 10.3.7*, are determined as follows:

(b) Force, F_i :

~~$F_i = fai\ C_{CV}\ \Delta^{0,47}$ MN~~.

$$F_i = fa_i C_{CV} \Delta_{UI}^{0,47} \text{ MN}$$

where
Δ_{UI} = ~~ship~~ displacement as defined in *Pt 8, Ch 2, 10.1 Definitions 10.1.2*, in kilo tonnes, not to be taken less than 5

~~10.5~~ 10.6 Hull areas other than the bow

Part only shown

~~10.5.1~~ 10.6.1 In the hull areas other than the bow, the force, F_{NB}, and line load, Q_{NB}, used in the determination of the load patch dimensions, b_{NB}, w_{NB}, and design pressure, P_a, are determined as follows:

(a) Force, F_{NB}:

where

Δ_F = ship displacement factor

~~$= \Delta^{0.64}$ if $\Delta \leq C_{DI}$~~

~~$= C_{DI}{}^{0.64} + 0{,}10\,(\Delta - C_{DI})$ if $\Delta > C_{DI}$~~

$= \Delta_{UI}{}^{0,64}$ if $\Delta_{UI} \leq C_{DI}$

$= C_{DI}{}^{0,64} + 0{,}10(\Delta_{DI} - C_{DI})$ if $\Delta_{UI} \leq C_{DI}$

Δ_{UI} = ~~ship~~ displacement as defined in *Pt 8, Ch 2, 10.1 Definitions 10.1.2*, in kilo tonnes, not to be taken less than 10

Existing sub-Sections 10.6 to 10.18 have been renumbered 10.7 to 10.19.

~~10.19~~ 10.20 Design vertical ice force at the bow

(Part only shown)

~~10.19.1~~ 10.20.1 The design vertical ice force at the bow, F_{IB}, is to be taken as the lesser of $F_{IB,1}$ or $F_{IB,2}$:

~~$F_{IB,1} = 0{,}534 C_L K_I{}^{0.15} \sin^{0.2}(\gamma_S) \sqrt{D K_h}$ MN~~

$F_{IB,1} = 0{,}534 C_L K_I{}^{0,15} sin^{0,2}(\gamma_S) \sqrt{\Delta_{UI} K_h}$ MN

where

Δ_{UI} = ~~ship~~ displacement as defined in *Pt 8, Ch 2, 10.1 Definitions 10.1.2*, in kilo tonnes, not to be taken less than 5

K_f = for blunt bow forms:

~~$K_f = \left(\frac{2CB^{(1-e_b)}}{1+e_b} \right)^{0,9} \tan(\gamma_s)^{-0,9(1+e_b)}$~~

$K_f = \left(\frac{2CB_{UI}{}^{(1-e_b)}}{1+e_b} \right)^{0,9} \tan(\gamma_s)^{-0,9(1+e_b)}$

~~$C = \frac{1}{2\left(\frac{L_B}{B}\right)^{eb}}$~~

$C = \frac{1}{2\left(\frac{L_B}{B_{UI}}\right)^{eb}}$

B_{UI} = ~~ship~~ the greatest moulded breadth corresponding to the upper ice waterline (UIWL), in metres

~~$y = \frac{B}{2\left(\frac{x}{L_B}\right)^{eb}}$ (see Figure 2.10.7 Bow shape definition and Figure 2.10.8 Illustration of effect on the bow shape e_b, for $B = 20$ and $L_B = 16$)~~

Δ_{UI} = ~~ship~~ displacement as defined in *Pt 8, Ch 2, 10.1 Definitions 10.1.2*, in kilo tonnes, not to be taken less than 10

A_{wp} = ~~ship~~ waterplane area corresponding to the upper ice waterline (UIWL), in m^2

~~Where applicable, draught dependent quantities are to be determined at the waterline corresponding to the loading condition under consideration.~~

Existing Figure 2.10.7 has been deleted and replaced with the below.

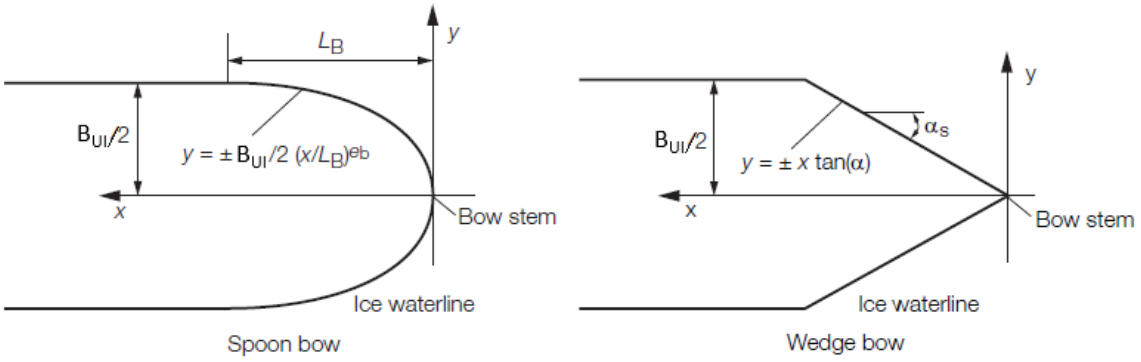

Figure 2.10.7 Bow shape definition

Existing Figure 2.10.8 has been deleted and replaced with the below.

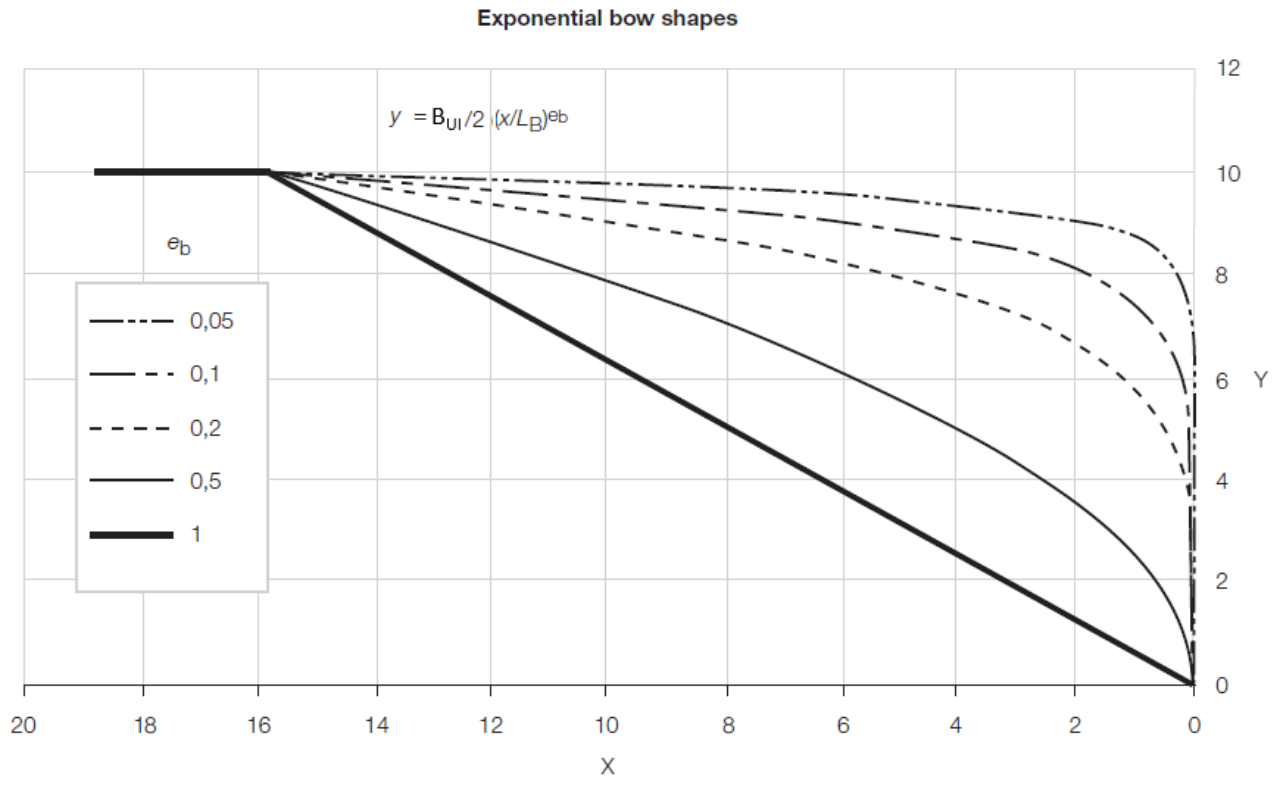

Figure 2.10.8 Illustration of effect on the bow shape e_b, for $B = 20$ and $L_B = 16$

~~10.20~~ 10.21 Design vertical shear force

10.21.1 The design vertical ice shear force, F_I, along the hull girder is to be taken as:

(a) Positive shear force

C f = 0,0 between the aft end of L_{UI} and 0,6L_{UI} from aft

C f = 1,0 between 0,9L_{UI} from aft and the forward end of L_{UI}

(b) Negative shear force

C f = 0,0 at the aft end of L_{UI}

C f = -0,5 between 0,2L_{UI} and 0,6L_{UI} from aft

C f = 0,0 between 0,8L_{UI} from aft and the forward end of L_{UI}

L_{UI} = length, as defined in *Pt 8, Ch 2, 10.1 Definitions 10.1.1* in metres

Existing paragraph 10.20.2 has been renumbered 10.21.2.

~~10.21~~ 10.22 Design vertical ice bending moment

(Part only shown)

~~10.21.1~~ 10.22.1 The design vertical ice bending moment, M_I, along the hull girder is to be taken as:

~~$M_I = 0,1 C_m L \sin^{-0,2}(\gamma_s) F_{IB}$ MNm~~

$M_I = 0,1 C_m L_{UI} sin^{-0,2}(\gamma_s) F_{IB}$ MNm

L_{UI} = ~~ship~~ length as defined in ~~*Pt 3, Ch 1, 6.1 Principal particulars 6.1.1*~~ *Pt 8, Ch 2, 10.1 Definitions 10.1.1*~~, but measured on the upper ice waterline (UIWL)~~, in metres

C_m = longitudinal distribution factor for design vertical ice bending moment to be taken as follows:
C_m = 0,0 at the aft end of L_{UI}
C_m = 1,0 between 0,5L_{UI} and 0,7L_{UI} from aft
C_m = 0,3 at 0,95L_{UI} from aft
C_m = 0,0 at the forward end of L_{UI}

~~Where applicable, draught dependent quantities are to be determined at the waterline corresponding to the loading condition under consideration.~~

~~10.21.2~~ 10.22.2 The applied vertical bending stress, ~~σ_a~~ σ_a, is to be determined along the hull girder in a similar manner as in *Pt 3, Ch 4 Longitudinal Strength*, by substituting the design vertical ice bending moment for the design vertical wave bending moment. The ship still water bending moment is to be taken as the permissible still water bending moment in sagging condition ~~maximum sagging moment~~.

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